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PATENT ABSTRACTS OF JAPAN

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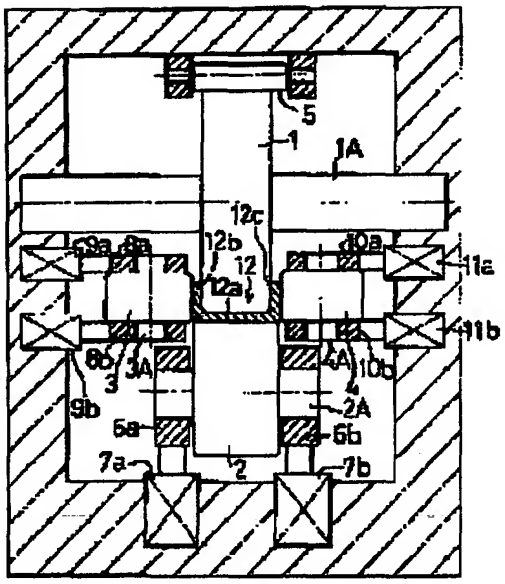
(54) METHOD FOR ROLL BENDING AND DEVICE THEREFOR

(57)Abstract:

PROBLEM TO BE SOLVED: To bend a work piece with nearly U-shaped section and the like at low cost and with high productivity and furthermore to improve freedom in the bending shape.

SOLUTION: A work piece 12 having bottom part 12a and a pair of flange parts 12b, 12c integrally provided on both sides of the bottom part 12a is subjected to bending. Regarding at least one of the rolls among the upper and lower rolls 1, 2 arranged on and under the work piece 12 and the right and left rolls 3, 4 arranged on the right and left sides of the work piece 12, the shaft of the roll is inclined and at the same time the roll and the other roll opposite to the former are made to move mutually nearer relatively. Thereby, concerning the facial part of the work piece 12 compressed by the roll surface of the inclined roll, the thickness of plate on the inclined side is more decreased than that of the opposite side, and according to the decrease of plate thickness the work piece 12 is drawn in the longitudinal direction and is bent.



LEGAL STATUS

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CLAIMS

[Claim(s)]

[Claim 1] It is the approach of carrying out bending of the workpiece which has a pars basilaris ossis occipitalis and the flange of the pair prepared in the both sides of this pars basilaris ossis occipitalis in one. The vertical roll of a pair with which this workpiece is arranged up and down, and each roll side contacts e vertical side of the pars basilaris ossis occipitalis of this workpiece, And about at least one roll in the right-and-left roll of a pair with which it is arranged in right and left of this workpiece, and each roll side contacts the external surface of the flange of this workpiece, while making the roll axes of this roll incline By carrying out contiguity migration of this roll and the roll with which this roll counters relatively The roll -rip-processing approach characterized by decreasing the board thickness of the side made to incline in ne surface part of this workpiece by which compression processing is carried out in the roll side of the this roll made to incline more greatly than the board thickness of the opposite side, and extending and carrying out bending of this workpiece to a longitudinal direction according to the decrement of this board thickness.

[Claim 2] It is equipment which carries out bending of the workpiece which has a pars basilaris ossis occipitalis and the flange of the pair prepared in the both sides of this pars basilaris ossis occipitalis in one. The vertical roll of a pair with which this workpiece is arranged up and down, and each roll side contacts the vertical side of the pars basilaris ossis occipitalis of this workpiece, And it is arranged in right and left of this workpiece, and has the right-and-left roll of a pair with which each roll side contacts the external surface of the flange of this workpiece. the roll with which this roll counters while tilting of roll axes of at least one roll in the above-mentioned vertical roll and the above-mentioned right-and-left roll is enabled -- relative -- contiguity -- the roll rolling bending equipment characterized by supposing that it is movable.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the roll rolling bending approach for carrying out bending of the workpiece by which the flange of a pair was prepared in the both sides of a pars basilaris ossis occipitalis in one, and its equipment.
[0002]
[Description of the Prior Art] For example, as a component part of an automobile, when carrying out bending of the cross-section horseshoe-shaped frame, generally the press-working-of-sheet-metal approach is used conventionally. This approach carries out bending of the cross-section horseshoe-shaped workpiece so that the top-face side where a flange projects may serve as convex or a concave.
[0003] For example, when carrying out bending so that the top-face side where a flange projects may serve as convex, the side plate of a pair is made for the female mold which has a curve convex mold face for the punch which has a curve concave mold face on the top face of the pars basilaris ossis occipitalis of a workpiece on the inferior surface of tongue of the pars basilaris ossis occipitalis of a workpiece to contact the external surface of the flange of a workpiece, respectively, and press bending is carried out, restraining a cross-section horseshoe-shaped workpiece completely.
[0004] In addition, when carrying out bending so that the top-face side where a flange projects may serve as a concave, the side plate of a pair is made for the female mold which has a curve concave mold face for the punch which has a curve convex mold face on the top face of the pars basilaris ossis occipitalis of a workpiece on the inferior surface of tongue of the pars basilaris ossis occipitalis of a workpiece to contact the external surface of the flange of a workpiece, respectively, and press bending is carried out, restraining a cross-section horseshoe-shaped workpiece completely like the above.
[0005]
roblem(s) to be Solved by the Invention] However, when using the above-mentioned press-working-of-sheet-metal approach, it is difficult to carry out bending of the workpiece so that it may become convex [of curvature predetermined by one-time press working of sheet metal]. For this reason, it is necessary to divide and carry out bending to press working of sheet metal of multiple times, and to prepare the vertical mold which has the curve concave convex mold face of each radius of curvature, respectively so that radius of curvature may become small gradually.
[0006] Therefore, the above-mentioned conventional press-working-of-sheet-metal approach does not pose a problem, especially when carrying out bending of the mass-production processing components, but when carrying out little processing production of the components of other types, the mold depreciation expenses per piece become high, and it leads to the jump of cost. Moreover, since press working of sheet metal of multiple times is required, productivity is also low. Furthermore, it is difficult to carry out bending of the workpiece to the configuration of arbitration.
[0007] this invention is made in view of the above-mentioned actual condition -- having -- workpieces, such as cross-section abbreviation horseshoe-shaped, -- low cost -- it is -- and productivity -- bending can be carried out highly and let it be the technical technical problem which should be solved to offer the bending approach which can moreover raise the degree of freedom of a bending configuration, and its equipment.
[0008]
[Means for Solving the Problem] The roll strip-processing approach of this invention which solves the above-mentioned technical problem It is the approach of carrying out bending of the workpiece which has a

ossis occipitalis in one. The vertical roll of a pair with which this workpiece is arranged up and down, and each roll side contacts the vertical side of the pars basilaris ossis occipitalis of this workpiece, And about at least one roll in the right-and-left roll of a pair with which it is arranged in right and left of this workpiece, and each roll side contacts the external surface of the flange of this workpiece, while making the roll axes of this roll incline By carrying out contiguity migration of this roll and the roll with which this roll counters relatively In the surface part of this workpiece by which compression processing is carried out in the roll side of the this roll made to incline, the board thickness of the side made to incline is decreased more greatly than the board thickness of the opposite side, and it is characterized by extending and carrying out bending of this workpiece to a longitudinal direction according to the decrement of this board thickness.

[0009] The roll rolling bending equipment of this invention which solves the above-mentioned technical problem It is equipment which carries out bending of the workpiece which has a pars basilaris ossis occipitalis and the flange of the pair prepared in the both sides of this pars basilaris ossis occipitalis in one. The vertical roll of a pair with which this workpiece is arranged up and down, and each roll side contacts the vertical side of the pars basilaris ossis occipitalis of this workpiece, And it is arranged in right and left of this workpiece, and has the right-and-left roll of a pair with which each roll side contacts the external surface of the flange of this workpiece. the roll with which this roll counters while tilting of roll axes of at least one roll in the above-mentioned vertical roll and the above-mentioned right-and-left roll is enabled -- relative -- contiguity -- it is characterized by supposing that it is movable.

[0010]

[Embodiment of the Invention] Hereafter, the roll rolling bending approach of this invention and the concrete operation gestalt of the equipment are explained, referring to a drawing. As that configuration is typically shown in drawing 1 , the workpiece 12 was arranged up and down and this roll rolling bending equipment is equipped with the vertical rolls 1 and 2 of a pair with which each roll side contacts the vertical side of pars-basilaris-ossis-occipitalis 12a of a workpiece 12, and the right-and-left rolls 3 and 4 of a pair with which it is arranged in right and left of a workpiece 12, and each roll side contacts the external surface of the flanges 12b and 12c of a workpiece 12.

[0011] The upper roll 1 is made rotatable by the drive roll 5 at the circumference of upper roll-axes 1A. The bottom roll 2 is made rotatable by the drive roll which is not illustrated at the circumference of bottom roll-axes 2A. The both ends of bottom [this] roll-axes 2A are supported by oil hydraulic cylinders 7a and 7b rockable through Bearings 6a and 6b. Each oil hydraulic cylinders 7a and 7b are made controllable independently by the control unit which is not illustrated.

[0012] The left roll 3 is made rotatable by the drive roll which is not illustrated at the circumference of left roll-axes 3A. The both ends of this left roll-axes 3A are supported by oil hydraulic cylinders 9a and 9b rockable through Bearings 8a and 8b. Each oil hydraulic cylinders 9a and 9b are made controllable independently by the control unit which is not illustrated. The right roll 4 is made rotatable by the drive roll which is not illustrated at the circumference of right roll-axes 4A. The both ends of this right roll-axes 4A are supported by oil hydraulic cylinders 11a and 11b rockable through Bearings 10a and 10b. Each oil hydraulic cylinders 11a and 11b are made controllable independently by the control unit which is not illustrated.

013] In addition, the vertical roll axes 1A and 2A and the right-and-left roll axes 3A and 4A of the above-mentioned vertical rolls 1 and 2 and the right-and-left rolls 3 and 4 have the axis in the same field. With this equipment, the upper roll 1 is made rotatable in a fixed position. and the bottom roll 2 -- actuation of oil hydraulic cylinders 7a and 7b -- the upper roll 1 -- receiving -- contiguity -- or so that remoteness may be carried out, while it is movable, tilting of bottom roll-axes 2A is enabled. moreover, the left roll 3 -- actuation of oil hydraulic cylinders 9a and 9b -- the right roll 4 -- receiving -- contiguity -- or so that remoteness may be carried out, while it is movable, tilting of left roll-axes 3A is enabled. on the other hand -- the right roll 4 -- actuation of oil hydraulic cylinders 11a and 11b -- the left roll 3 -- receiving -- contiguity -- or so that remoteness may be carried out, while it is movable, tilting of right roll-axes 4A is enabled.

[0014] Here, while carrying out contiguity migration to the left roll 3 about the right roll 4, signs that right roll-axes 4A tilts are explained based on drawing 2 . In addition, the bottom roll 2 and the left roll 3 as well as the right roll 3 act. For example, when carrying out tilt of the right roll-axes 4A of the right roll 4 to the side approaching the left roll 3 with which upper limit counters, the piston rod section of upper oil hydraulic cylinder 11a is advanced more greatly than the piston rod section of lower oil hydraulic cylinder 11b by making supply oil pressure to upper oil hydraulic cylinder 11a larger than the supply oil pressure to lower oil

10b, and is tilted in the direction approaching the left roll 3 with which the upper limit side counters. What is necessary is on the other hand, just to advance more greatly than the piston rod section of upper oil hydraulic cylinder 11a the piston rod section of lower oil hydraulic cylinder 11b conversely by making supply oil pressure to lower oil hydraulic cylinder 11b larger than the supply oil pressure to upper oil hydraulic cylinder 11a, when carrying out tilt of the right roll axes 4 of the right roll 4 to the side approaching the left roll 3 with which a lower limit counters. Moreover, what is necessary is just to make equivalent supply oil pressure to the up-and-down oil hydraulic cylinders 11a and 11b, when only carrying out contiguity migration of the right roll 4 to the left roll 3 which counters, without carrying out tilt of the right roll-axes 4A.

[0015] Hereafter, how to carry out bending of the workpiece 12 concretely is explained. With this operation gestalt, the cross-section horseshoe-shaped object which has the flanges 12b and 12c of the pair prepared in the both sides of pars-basilaris-ossis-occipitalis 12a and pars-basilaris-ossis-occipitalis 12a in one as a workpiece 12 was prepared. First, about the above-mentioned workpiece 12, as shown in drawing 3 , the case where bending (elongation flange) is carried out so that the top-face side of pars-basilaris-ossis-occipitalis 12a may serve as convex is explained. In this case, as shown in drawing 4 , only suppose that it is the vertical rolls 1 and 2 to restrain the vertical side of pars-basilaris-ossis-occipitalis 12a, without rolling out pars-basilaris-ossis-occipitalis 12a of a workpiece 12. That is, contiguity migration of the bottom roll 2 is carried out to the upper roll 1, without setting a workpiece 12 and carrying out tilt of the bottom roll-axes of after that 2A so that the top face of pars-basilaris-ossis-occipitalis 12a of a workpiece 12 may contact the roll side of the upper roll 1 arranged in the fixed position, and the roll side of the bottom roll 2 is made to contact the inferior surface of tongue of pars-basilaris-ossis-occipitalis 12a of workpiece 12. And tilt of the right-and-left roll axes 3A and 4A is carried out so that the upper limit side may approach mutually, and the right-and-left rolls 3 and 4 are made to approach mutually by the oil hydraulic cylinders 9a and 9b on either side and actuation of 11a and 11b. In addition, it is made for the movement magnitude of the longitudinal direction of the right-and-left rolls 3 and 4 and the amount of tilt of the right-and-left roll axes 3A and 4A to become equivalent mutually in the right-and-left rolls 3 and 4. Moreover, the flanges 12b and 12c of the workpiece 12 which the roll side of the right-and-left rolls 3 and 4 contacts are pinched and rolled out between the roll side of the right-and-left rolls 3 and 4, and the side face of the upper roll 1.

[0016] While carrying out the rotation drive of the upper roll 1 by actuation of a drive roll 5, with such a condition maintained, the rotation drive of the bottom roll 2 and the right-and-left rolls 3 and 4 is carried out by actuation of the drive roll which is not illustrated. Thereby, after the vertical side of pars-basilaris-ossis-occipitalis 12a of a workpiece 12 has been restrained by the roll side of the vertical rolls 1 and 2, the flanges 12b and 12c of a workpiece 12 are rolled out. And in the surface part of the flanges 12b and 12c of the workpiece by which compression processing is carried out in the roll side of the right-and-left rolls 3 and 4 made to incline, the board thickness of the side made to incline can be decreased more greatly than the board thickness of the opposite side, and bending of the workpiece 12 can be extended and carried out to a longitudinal direction according to the decrement of this board thickness. That is, in the flanges 12b and 12c of a workpiece 12, an upper part side can be made larger in reduction of sectional area than a lower part side, the board thickness by the side of the upper part of flanges 12b and 12c is decreased rather than the board thickness by the side of a lower part, and only the decrement of this board thickness can extend the upper part side of flanges 12b and 12c to a longitudinal direction, and bending can be carried out so that the top-face side of pars-basilaris-ossis-occipitalis 12a of a workpiece 12 may serve as convex as a result.

[0017] In addition, although it is also possible to carry out bending like the above, rolling out pars-basilaris-ossis-occipitalis 12a of a workpiece 12, the direction which does not roll out pars-basilaris-ossis-occipitalis 12a as mentioned above can carry out bending greatly more effectively. Below, about the above-mentioned workpiece 12, as shown in drawing 5 , the case where bending (shrinkage flange) is carried out so that the top-face side of pars-basilaris-ossis-occipitalis 12a may serve as a concave is explained. In this case, contiguity migration of the bottom roll 2 is carried out to the upper roll 1, without setting a workpiece 12 and carrying out tilt of the bottom roll-axes of after that 2A so that the top face of pars-basilaris-ossis-occipitalis 12a of a workpiece 12 may contact the roll side of the upper roll 1 arranged in the fixed position as shown in drawing 6 , and pars-basilaris-ossis-occipitalis 12a of a workpiece 12 pinches and rolls out between the roll side of the upper roll 1, and the roll side of the bottom roll 2. And tilt of the right-and-left roll axes 3A and 4A is carried out so that the lower limit side may approach mutually, and the right-and-left rolls 3 and 4 are made to approach mutually by the oil hydraulic cylinders 9a and 9b

longitudinal direction of the right-and-left rolls 3 and 4 and the amount of tilt of the right-and-left roll axes 3A and 4A to become equivalent mutually in the right-and-left rolls 3 and 4. Moreover, the flanges 12b and 12c of the workpiece 12 which the right-and-left roll 3 and the roll side of 4 ** contact are pinched and rolled out between the roll side of the right-and-left rolls 3 and 4, and the side face of the upper roll 1.

[0018] While carrying out the rotation drive of the upper roll 1 by actuation of a drive roll 5, with such a condition maintained, the rotation drive of the bottom roll 2 and the right-and-left rolls 3 and 4 is carried out by actuation of the drive roll which is not illustrated. Thereby, the flanges 12b and 12c of a workpiece 12 are rolled out, the vertical side of pars-basilaris-ossis-occipitalis 12a of a workpiece 12 being rolled out by the roll side of the vertical rolls 1 and 2. And in the surface part of the flanges 12b and 12c of the workpiece by which compression processing is carried out in the roll side of the right-and-left rolls 3 and 4 made to incline, the board thickness of the side made to incline can be decreased more greatly than the board thickness of the opposite side, and bending of the workpiece 12 can be extended and carried out to a longitudinal direction according to the decrement of this board thickness. That is, in the flanges 12b and 12c of a workpiece 12, a lower part side can be made larger in reduction of sectional area than an upper part side, the board thickness by the side of the lower part of flanges 12b and 12c is decreased rather than the board thickness by the side of the upper part, and only the decrement of this board thickness can xtend the lower part side of flanges 12b and 12c to a longitudinal direction, and bending can be carried out so that the top-face side of pars-basilaris-ossis-occipitalis 12a of a workpiece 12 may serve as a concave as a result.

[0019] In addition, although bending can be carried out as well as the above when not rolling out only by restraining pars-basilaris-ossis-occipitalis 12a of a workpiece 12, the direction which rolled out pars-asilaris-ossis-occipitalis 12a as mentioned above can carry out bending greatly more effectively.

Furthermore, the case where bending is carried out to a longitudinal direction into the same field as pars-basilaris-ossis-occipitalis 12a about the above-mentioned workpiece 12 as shown in drawing 7 is explained. In this case, as shown in drawing 8 , a workpiece 12 is set so that the top face of pars-basilaris-ossis-occipitalis 12a of a workpiece 12 may contact the roll side of the upper roll 1 arranged in the fixed position. And by actuation of oil hydraulic cylinders 7a and 7b, tilt is carried out so that the right-hand side of bottom roll-axes 2A may incline up, and contiguity migration of the bottom roll 2 is carried out to the upper roll 1, and pars-basilaris-ossis-occipitalis 12a of a workpiece 12 is pinched and rolled out between the roll side of the upper roll 1, and the roll side of the bottom roll 2. Moreover, contiguity migration is carried out by actuation of oil hydraulic cylinders 9a and 9b to the right roll 4 which counters without carrying out tilt of the left roll-axes 3A, and the roll side of the left roll 3 is made to contact the external surface of flange 12b of a workpiece 12. In addition, this flange 12b is [that that inside-and-outside side is only restrained by the side face of the upper roll 1, and the roll side of the left roll 3, and], and is not rolled out. On the other hand, without carrying out tilt of the right roll-axes 4A, contiguity migration is carried out to the left -ll 3, and the right roll 4 makes the roll side of the right roll 4 contact the external surface of flange 12c of a workpiece 12 by actuation of oil hydraulic cylinders 11a and 11b. At this time, that inside-and-outside side is pinched with the side face of the upper roll 1, and the roll face-to-face of the left roll 3, and, as for this flange 12c, is rolled out.

[0020] While carrying out the rotation drive of the upper roll 1 by actuation of a drive roll 5, with such a ndition maintained, the rotation drive of the bottom roll 2 and the right-and-left rolls 3 and 4 is carried out by actuation of the drive roll which is not illustrated. Thereby, flange 12c of a workpiece 12 is rolled out, the right-hand side part of pars-basilaris-ossis-occipitalis 12a of a workpiece 12 being rolled out by the roll side of the vertical rolls 1 and 2. And in the surface part of pars-basilaris-ossis-occipitalis 12a of the workpiece by which compression processing is carried out in the roll side of the bottom roll 2 made to incline, the board thickness of the side made to incline can be decreased more greatly than the board thickness of the opposite side, and bending of the workpiece 12 can be extended and carried out to a longitudinal direction according to the decrement of this board thickness. That is, in pars-basilaris-ossis-occipitalis 12a of a workpiece 12, right-hand side can be made larger in reduction of sectional area than left-hand side, and the board thickness on the right-hand side of pars-basilaris-ossis-occipitalis 12a is decreased rather than left-hand side board thickness, and only the decrement of this board thickness can extend the right-hand side of pars-basilaris-ossis-occipitalis 12a to a longitudinal direction, and, as a result, can carry out bending of the workpiece 12 to a longitudinal direction into the same field as pars-basilaris-ossis-occipitalis 12a.

[0021] In addition, although bending can be carried out when not rolling out only by restraining flange 12c on the right-hand side of a workpiece 12, or as well as the above when also rolling out left-hand side flange

greatly more effectively. Moreover, in the above-mentioned explanation, the degree of bending can be easily adjusted to arbitration by adjusting suitably the movement magnitude and the amount of tilt of the bottom roll 2 and the right-and-left rolls 3 and 4. Moreover, it is in the middle of processing, and it is also possible by changing the movement magnitude and the amount of tilt of the bottom roll 2 or the right-and-left rolls 3 and 4 to change the direction of bending and a bending degree on the way.

[0022] According to this invention, in roll strip-processing equipment equipped with the vertical rolls 1 and 2 of a pair, and the right-and-left rolls 3 and 4 of a pair, bending of the cross-section horseshoe-shaped workpiece 12 which has the flanges 12b and 12c of pars-basilaris-ossis-occipitalis 12a and a pair can be easily carried out to arbitration by easy amelioration of making tiltable the roll axes of at least one roll so that clearly from the above explanation.

[0023] therefore, workpieces, such as cross-section abbreviation horseshoe-shaped, -- low cost -- it is -- and productivity -- bending can be carried out highly and it becomes possible to raise the degree of freedom of a bending configuration moreover. Moreover, since the ingredient yield improves compared with press working of sheet metal in the case of strip processing, it contributes also to reduction of material expense. In addition, although the above-mentioned operation gestalt explained the example to which tilt of the roll axes is carried out using an oil hydraulic cylinder, the approach of carrying out tilt of the roll axes is not limited to this. For example, as shown in drawing 9 , it is also possible to consider as the configuration which formed the gear section 16 which engages with the ball screw 15 which supports right roller 4 grade rockable to the circumference of a pivot 13, and carries out a rotation drive by the drive of the drive motor 14 in which forward inverse rotation is possible in the right roller 4. Tilt of the right roller shaft 4A of the right roller 4 can be carried out with rotation of ** and a ball screw 15 by this configuration, and the direction of tilt of right roller shaft 4A can be controlled for the amount of tilt of right roller shaft 4A again according to the hand of cut of a ball screw 15 according to the rotation of a ball screw 15.

[0024] Moreover, although the above-mentioned operation gestalt explained the example which carries out bending of the cross-section horseshoe-shaped workpiece 12 which has the flanges 12b and 12c of pars-basilaris-ossis-occipitalis 12a and a pair, it is also possible to apply to the thing of the shape of a cross section of U characters whose pars-basilaris-ossis-occipitalis 12a is not a flat side but a curve side, and the cross-section hat-like thing by which the flange was prepared in flanges 12b and 12c in one.

[0025]

[Effect of the Invention] according to [as explained in full detail above] this invention -- workpieces, such as cross-section abbreviation horseshoe-shaped, -- low cost -- it is -- and productivity -- bending can be carried out highly and it becomes possible to raise the degree of freedom of a bending configuration moreover. Moreover, since the ingredient yield improves compared with press working of sheet metal in the case of strip processing, it contributes also to reduction of material expense.

[Translation done.]

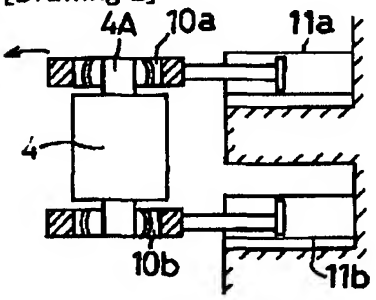
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view showing typically the configuration of the roll strip-processing equipment concerning this operation gestalt.
[Drawing 2] It is a sectional view explaining signs that start this operation gestalt and tilt of the roll is arried out.
[Drawing 3] It is the perspective view of the workpiece which carried out bending so that this operation gestalt might be started and the top-face side of a pars basilaris ossis occipitalis might serve as convex.
[Drawing 4] It is a sectional view explaining signs that bending is carried out so that this operation gestalt ay be started and the top-face side of a pars basilaris ossis occipitalis may serve as convex.
[Drawing 5] It is the perspective view of the workpiece which carried out bending so that this operation gestalt might be started and the top-face side of a pars basilaris ossis occipitalis might serve as a concave.
[Drawing 6] It is a sectional view explaining signs that bending is carried out so that this operation gestalt may be started and the top-face side of a pars basilaris ossis occipitalis may serve as a concave.
[Drawing 7] It is the perspective view of the workpiece which started this operation gestalt and carried out bending to the longitudinal direction into the same field as a pars basilaris ossis occipitalis.
[Drawing 8] It is a sectional view explaining signs that start this operation gestalt and bending is carried out to a longitudinal direction into the same field as a pars basilaris ossis occipitalis.
[Drawing 9] It is a sectional view explaining signs that start this operation gestalt and tilt of the roll is carried out.
[Description of Notations]
1 — Top roll 2 — Bottom roll 3 [1A — Top roll axes 2A / 4A / — Workpiece / 12a — A pars basilaris ossis occipitalis 12b, 12c — Flange / — Right roll axes 7a, 7b, 9a, 9b, 11a, and 11b — Oil hydraulic cylinder ? / — Bottom roll axes, 3A — Left roll axes] — A left roll, 4 — Right roll

[Translation done.]

DRAWINGS

[Drawing 2]



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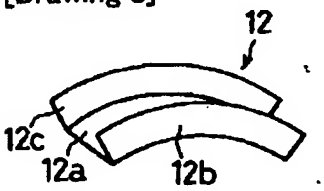

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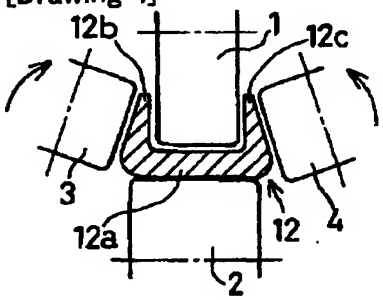
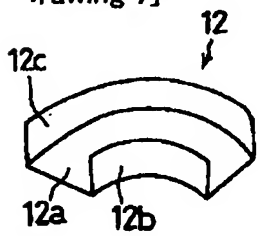
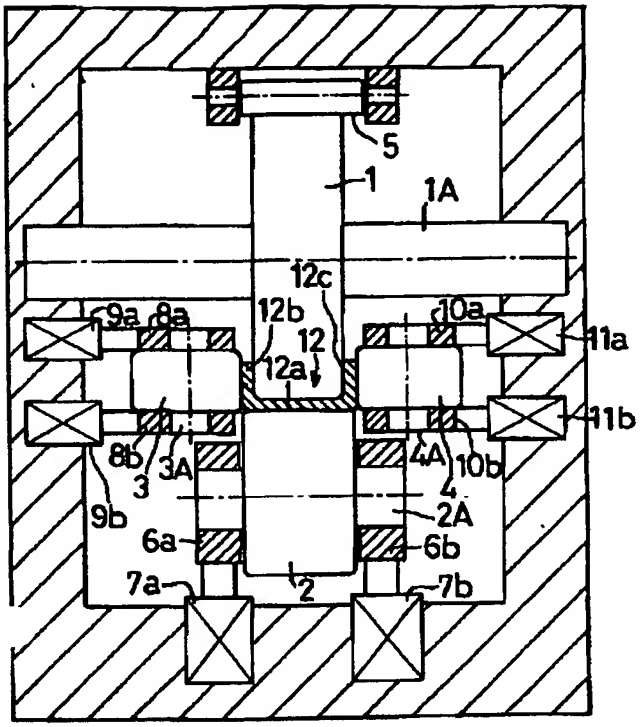


[Drawing 7]

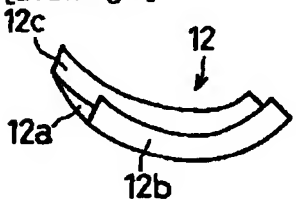


[Drawing 1]

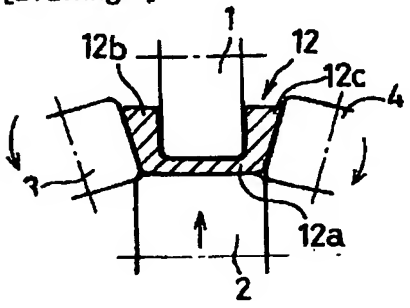


1—上ロール、2—下ロール、3—左ロール、4—右ロール
12—被加工物、12a—底部、12b、12c—フランジ部

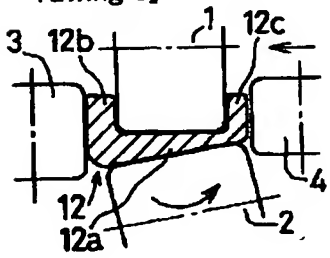
[Drawing 5]



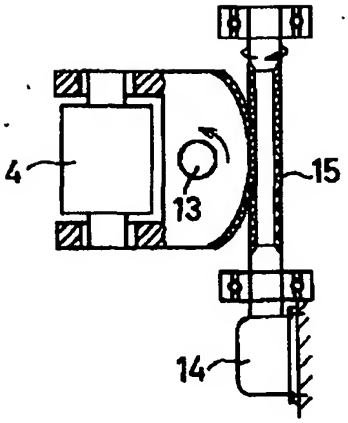
[Drawing 6]



rawing 8]



[Drawing 9]



[Translation done.]